
U.S. TRADE AND DEVELOPMENT AGENCY



EXECUTIVE SUMMARY

Chiren Underground Gas Storage and the Establishment of a Natural Gas Information System for Bulgargaz Ead

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1. INTRODUCTION

1.1 EXECUTIVE SUMMARY

During the recent years, there is an accelerating base gas pressure decline at Chiren, which means that ever-increasing quantities of gas have to be injected just to maintain base gas pressure. This gas is difficult to recover without farther reduction of pressure. The declining pressure causes inefficiency of operations, due to excessive use of gas; to maintain pressure. Therefore *current mode of operations must be changed*.

Surface facilities analysis leads us to believe that volumes of up to 4 million cubic meters per day can be handled almost without surface facilities and tubing upgrades. Current daily volumes are much lower (about 2.5 million cubic meters per day), and we do not expect daily volumes at Chiren to go sharply up within 23 years. While there is no immediate need to drill new wells, or execute major upgrades on surface facilities, this will become necessary after 2003, or when daily volumes of gas exceed 4 million cubic meters per day.

It seems possible to limit further excessive use of gas, while maintaining or upgrading current daily volumes of operations (up to about 3.2 million cubic meters per day), by simply redirecting gas flows from "inefficient" wells (which do not keep pressure well) to "efficient" wells that keep pressure better. By "efficient" wells, we refer to those injection/withdrawal wells that maintain or enhance the operational and economics of the Chiren reservoir, while the term "inefficient" wells refers to those whose continued operation impairs economics and risks potentially unacceptable costs in the medium to long term. Using "efficient" wells, and suspending "inefficient" wells wherever possible, will immediately cut operational cost by reducing gas use, the frequency of well workovers, and the demand for new wells.

Based on these premises, the suggested approach to the expansion of the Chiten UGS is phased:

Phase 1 is essentially cost optimization and reduction via the introduction of remote telemetry wellhead metering, database, reservoir monitoring, simulation and management technologies, none of which currently exist at Bulgargaz. The expected duration of Phase 1 is two to three years, and the estimated *capital cost* is about \$1 million. We strongly recommend the investment to be made and the technologies to be implemented promptly, i.e. in early 2001. A major element of *operational cost* during this period would be the continuation of the program of well testing, logging and servicing already in place, with incremental program expenditures estimated at \$3 to 5 million.

- Phase 2 would consist of upgrades of surface facilities and debottlenecking with the objective of bringing storage deliverability to 4 - 4.4 million cubic meters per day. Phase 2 may last several years, e.g. from 2003 to 2007. While we do not have at this time good estimate of capital and operational cost for Phase 2 (such data would be generated

during Phase 1), it is conceivable that capital cost during Phase 2 would be about \$5 million, but operational cost would be lower than during Phase 1. We believe that Bulgargaz will be able to finance Phase 2 out of its own resources. We estimate the payoff of Phase 2 investment to be short (up to 2-3 years), due to economy of gas and other operational expenditure as a result of the upgrades.

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Phase 3 would involve further expansion of storage deliverability, up to 5 million cubic meters per day or more. In all likelihood, Phase 3 will require the drilling of a number of new wells. It will also involve additional compression and other surface facilities upgrades. Therefore, capital cost will be much higher in comparison to Phase 1 or 2. For example, if 6 to 8 new wells were to be drilled, the associated capital expenditure may exceed \$12 million, and additional resources would be needed for surface facilities upgrades. Some scenarios require 10-12 new wells. Bulgargaz may require external financing to be able to carry out Phase 3 program. The implementation of Phase 3 may last two to three years, for example from 2006 to 2008. The chances for full-scale expansion of the Chiren UGS during Phase 3 will increase, if the storage were to be restructured and used as gas hub for the emerging free market in Bulgaria. Revenue from services rendered on the basis of gas hub operations should offset the cost of Phase 3 and provide reasonable return on investment. Therefore, the development of the Chiren UGS gas hub services program should begin during Phase 1 and continue through Phase 2 of the project.

While the Chiren UGS storage should be regarded as a viable long-term asset of Bulgargaz and Bulgaria, its current state is a cause of serious concern. Prompt action must be taken to avoid further deliverability deterioration and provide the know-how, technology and management base for informed decision-making and expansion during Phase 2 and 3 of the project.

The full-scale expansion of the Chiren UGS would be facilitated to a great degree by the deregulation of the gas market in Bulgaria and the region, and the ability of the operator of the storage to provide gas hub services on a competitive basis.